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Computing at Lehigh

Lehigh University

Computing at Lehigh

Newsletter of the
Lehigh University Computing Center

Volume XVII, Number 2

Lehigh University Computing Center

PostScript Graphics

Contents

From the Director

William R. Harris (WRH0@LEHIGH)

The Computing Center and the Computing Center Advisory Committee (CCAC) have been addressing many of the longer term and critical computing issues facing the University. Although the plans are only in the initial stages, I would like to tell you about some of the issues being addressed and what is being done.

Central Support of Workstations

During interactions with workstation vendors, it has been stated that LUCC will be involved in the support of workstations, possibly providing hardware repair service and sales of low-end workstation models through the Microcomputer Store. LUCC would be responsible for the distribution of workstation software as well as consulting and training services. The costs and personnel needs associated with these additional services have not been determined. The Planning Subcommittee of the CCAC recommended that the Computing Center investigate the needs and write a report, defining the associated costs.

See Director, page 3

Lehigh University Computing Center Hardware

CDC CYBER 180 Model 850 (32 MBytes Memory, NOS/VE V1.4.2)
IBM 4381 Model 11 (16 MBytes Memory, VSE/SP V2.1.5)—Administrative
IBM 4381 Model 13 (24 MBytes Memory, VM/SP HPO V1.5.0, MUSIC/SP V1.2)—Network Server
VAX 8530 (32 MBytes Memory, VMS V5.2)

Computing at Lehigh est. 1986

Lehigh University Computing Center Newsletter

General Editor ..... Blair R. Bernhardt
Copy Editor ..... Monica A. Newman

194 E.W. Fairchild-Martindale Library and Computing Center #8b
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General Information

Computing at Lehigh is a report on computing, published four times a year by the Lehigh University Computing Center. Article contributions are primarily by Computing Center staff, although users are also encouraged to contribute. Instructions for submitting articles can be found at the end of this newsletter.

Subscriptions to *Computing at Lehigh* are free of charge to those in the Lehigh University Computing Center user community and to other interested parties. Those who wish to subscribe to *Computing at Lehigh* or make changes regarding their subscription should return the mailing list form included at the end of this newsletter.

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Computing at Lehigh is formatted with XEROX's Ventura Publisher™ and printed on a PostScript™ printer.

Public Site Hours (Academic Schedule)

	Room Hours	Student Consulting Hours
Central Site Users' Area, 180 Fairchild-Martindale		
Sun	12:00 noon – 12:00 midn	12:00 noon – 12:00 midn
Mon–Thu	6:30 am – 12:00 midn	8:00 am – 12:00 midn
Fri	6:30 am – 10:00 pm	8:00 am – 5:00 pm
Sat	9:00 am – 8:00 pm	10:00 am – 8:00 pm
Central Site Microlab, 292 Fairchild-Martindale		
Sun	12:00 noon – 12:00 midn	no consulting
Mon–Thu	6:30 am – 12:00 midn	no consulting
Fri	6:30 am – 10:00 pm	no consulting
Sat	9:00 am – 8:00 pm	no consulting
Drown, Room 208		
Mon–Thu	8:00 am – 10:00 pm	no consulting
Fri	8:00 am – 6:00 pm	no consulting
Sat	8:00 am – 1:00 pm	no consulting
Fritz Lab Annex, Room A3		
Mon–Fri	8:00 am – 10:00 pm	no consulting
Grace, Room 28		
Sun	24 hours	2:00 pm – 12:00 midn
Mon–Thu	24 hours	1:00 pm – 12:00 midn
Fri–Sat	24 hours	1:00 pm – 5:00 pm
Libraries: Fairchild-Martindale, Linderman, & Media Center		
Sun	12:00 noon – 12:00 midn	no consulting
Mon–Sat	8:00 am – 12:00 midn	no consulting
Maginnes, Room 491		
Mon–Fri	8:00 am – 10:00 pm	no consulting
Sat	9:00 am – 1:00 pm	no consulting
Mountaintop Campus, B103 Building A		
Mon–Thu	6:30 am – 10:30 pm	no consulting
Fri	6:30 am – 5:30 pm	no consulting
Mountaintop Campus, D109, D117 Building A		
Mon–Thu	6:30 am – 10:30 pm	1:00 pm – 4:00 pm
Fri	6:30 am – 5:30 pm	1:00 pm – 4:00 pm
Packard, Room 502		
Mon–Thu	8:00 am – 10:00 pm	10:00 am – 10:00 pm
Fri	8:00 am – 10:00 pm	10:00 am – 5:00 pm
Sat	8:00 am – 2:00 pm	no consulting
Whitaker, Room 257		
Mon–Thu	8:00 am – 8:00 pm	10:00 am – 12:00 noon 1:00 pm – 3:00 pm
Fri	8:00 am – 5:00 pm	10:00 am – 12:00 noon 1:00 pm – 3:00 pm

Business Hours

Business Office, 394 Fairchild-Martindale
Mon–Fri 8:15 am – 12:00 noon
1:00 pm – 4:45 pm

User Services, 185/194/196 Fairchild-Martindale
Mon–Fri 8:00 am – 12:00 noon
1:00 pm – 5:00 pm

Microcomputer Store, 524 Brodhead Ave.
Mon–Fri 9:00 am – 5:00 pm

Operations, 171 Fairchild-Martindale
Mon–Fri 8:00 am – 11:30 am
1:00 pm – 4:30 pm

Operator Support/Machine Room, 179 Fairchild-Martindale
Sun 2:00 pm – 10:00 pm
Mon–Thu 8:00 am – 12:00 midn
Fri 8:00 am – 10:00 pm
Sat 9:00 am – 5:00 pm

Special Forms Processing Hours

Liquid Ink Plots
Tue,Fri 8:00 am – until done

Computing Center Directory

Information About Policies and Plans
Director
William R. Harris .... (215) 758-3830
Associate Director
of Computing Consulting Services
Timothy J. Foley 758-3830
Associate Director
of Computing Facilities
Carol D. Lidie 758-3989
Systems Programming Manager
Kevin R. Weiner 758-3991
Microcomputer Store Manager
Robert R. Kendi 758-4606
User Services Manager
Monica A. Newman 758-3990

Information About Bills Received
Administrative Associate
Pamela S. Steigerwalt 758-3825
Accounting Assistant
Annette L. Ruhe 758-3825

Consulting
User Consultants
Blair R. Bernhardt 758-3994
Frederick W. Chapman 758-3218
Dean E. Nelson 758-4988
Linda S. Orr 758-5152
Richard A. Silvius 758-3985
Binod K. Taterway 758-3984

Information About Software Availability
Software Librarian - Mainframe
Judith K. Allio 758-3993
Software Librarian - Microcomputer
Doris A. Oravec 758-4592

Systems Status, Technical Information
On-duty Consultant
..... 758-4141

General User Information
Administrative Clerk
Lori F. Hertzog 758-3990
Accounts Coordinator
Ann Marie Matusa 758-3992

Information About Tapes and Supplies
Data Processing Tape Librarian
..... 758-4140

Consulting Policy

Consultants are provided to assist users in the use of Lehigh University's computer resources. Consultants are not authorized to interpret course assignments, write code, or debug program logic.

When in need of a consultation, users are requested to contact the LUCC student consultants (present at several of the public sites and at ext. 84141), who are hired to augment the full-time staff consultants.

Computer	On-Campus Phone (300-19.2K Baud)	Off-Campus Phone (1200/2400 Baud)	Network Node Name	Network
Network Server	(NS) Ext. 46000	974-6000	LEHIGH	BITNET
CYBER 850	(CDC) Ext. 46800	974-6800	CDC1.CC.Lehigh.EDU	Internet
VAX 8530	(VAX) Ext. 46400	974-6400	VAX1.CC.Lehigh.EDU	Internet

Director, from front cover

Planning for CYBER 850 (July 1990) and Determination of Supercomputer (or near-Supercomputer) Needs

These two items are closely related and will be looked at together. As mentioned in last year's planning document, the amortization of the CYBER will be complete in July 1990. It should be determined how the CYBER services will be provided after that time. Assuming the funding is available, the present machine could be replaced with another CYBER, but alternatives should be considered. A potential option, which should be investigated, is providing the services on the high-speed network by using server machines specialized to function in a particular area – for instance, compute servers (minisupercomputer or super workstations), database servers, file servers, and mail servers.

The CCAC has formed a subcommittee to address these two areas. The subcommittee consists of LUCC staff, faculty presently using the CYBER, and faculty needing powerful computing capabilities. The subcommittee members are not all members of the CCAC. Ed Kay, chairman of the CCAC, proposed the subcommittee membership. The subcommittee has begun meeting.

Network Server Capacity and Enhancement

The Network Server is at capacity and future applications and workload are not possible without causing a concurrent degradation in performance. The cost of the next upgrade from the IBM 4381 model Q13 to a model R91 is $156,000. LUCC has also looked into other lower cost upgrade options. In addition, the cost of a new release of the MUSIC operating system is $10,000 per year. The hardware can be upgraded as need be, at a cost, but the main limitation is the MUSIC operating system. The Network Server is the only LUCC computer not capable of fully participating with the high-speed network, has file system limitations, and has restrictions on the number of simultaneous users. The Computing Center has been investigating the feasibility of a distributed mail and information system. The CCAC suggested that LUCC investigate other joint projects with vendors interested in the capabilities of the Network Server, operating in a distributed Unix environment. Moving ahead in a joint project is a critical University computing issue.

Public Microcomputer Replacement

During 1985, two hundred Zenith Z-158 microcomputers were installed at the LUCC public computing sites. Since that time, higher performance machines have been added, bringing the total to two hundred and fifty machines. For planning purposes, assuming 30 machines were replaced per year at $3,000 per machine, the cost would be $90,000 per year and take seven years to replace all the Z-158's. At that point, the last 30 machines will be ten years old and it is doubtful that they will be operating – because of hardware failures or, more likely, incompatibility with the software in the mid 1990s.

Faculty Microcomputer Replacement

The same kinds of problems exist with the faculty machines, except we have less information. For instance, we know that there were roughly 360 Z-158's and 40 Z-241's distributed in 1985. We don't know for sure how many of the machines are still used by faculty members, or how many of the original machines were replaced with more powerful machines with the original machines being passed on to someone else. The CCAC discussed doing an inventory or a survey, but it was felt that there were legitimate needs to upgrade or replace some of the machines. It was suggested that a fund of $25,000 be set aside by the Center, and a request be made for an additional $25,000 (or more) for the 1990-91 budget year. Faculty could submit requests for upgrades and replacements from that fund. A subcommittee has been set up to review the requests, much like the CCAC Software Subcommittee. This way, we would make some progress and also get a better feel for the scope of the problem.

It was felt that the subcommittee should take a broader focus and look at what the replacement needs are (types of machines, numbers, etc.) and then focus on the funding methods. There was concern that the replacement fund would be viewed as a solution to the problem, where it is far short of a plan to solve the problem.♦

Mainframe Computing

SAS/IML - A Comprehensive Matrix Language

Dean E. Nelson (DEN0@LEHIGH)

The SAS statistical system (available on the VAX 8530) contains a high level language which can be used to define and manipulate sets of data. SAS contains statistical procedures such as PROC GLM and PROC CATMOD which provide use of the general linear model for both continuous and categorical data. Also available are many less general procedures for testing a wide variety of hypotheses for many types of data and experimental designs. However, statistics is a fast-changing science, and it is not possible to provide each

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and every new development in any software package. Therefore, the IML matrix language was included in SAS to provide the user with the ability to program unsupported statistical methods.

SAS/IML may be used to read SAS data sets, perform analyses, and create new SAS data sets. Passing data into IML from SAS is accomplished with one command line. Since the data elements in IML are matrices, operations (such as multiplication) which require many lines in other languages are accomplished in one assignment statement. The amount of code required for matrix operations is reduced and made more readable. IML contains both matrix and elementwise operations. There are several dozen operators including arithmetic, statistical, logical, linear, numerical, time series, and more.

IML provides a comprehensive set of control statements including LINK, IF-THEN/ELSE, DO/END, iterative DO, STOP, and GOTO. The language also supports the use of subroutines. There are a variety of graphics commands to produce scatter plots, lines and curves, as well as textual annotations on the graphs. As an example of the matrix language, the following code defines two vectors, X and Y, and then obtains the least squares estimates for the linear regression coefficients vector resulting from regressing Y on X.

```
PROC IML;
X={1,1 1,2 1,3 1,4 1,5 1,6 1,7 1,8 1,9 1,10};
Y={11,22,32,45,56,66,75,84,97,104};
B=INV(X'*X)*X'*Y;
PRINT B;
```

```
B          COL1
ROW1      1.8000
ROW2     10.4364
```

The vector B contains the least squares estimates of the intercept and slope.

SAS/IML also provides functions for evaluating statistics. For instance, the following program is used as a t-test table look-up. Several t statistics with 15 degrees of freedom are defined as a matrix. The PROBT function is used to evaluate the tail probability of each statistic.

```
PROC IML;
T={1.47,1.68,2.05,2.65};
PVALUE=1-PROBT(T,15);
PRINT PVALUE;
```

```
PVALUE        COL1
ROW1       .0811122
ROW2       .0568292
ROW3       .0291339
ROW4       .0090957
```

Notice that the PROBT function returned the probability that a random variable with a t distribution falls below the given value. The function returned a probability for every value in the argument matrix. The p-values computed are exact, in contrast to the discontinuous tables provided in most statistics texts. In addition to the t distribution, SAS/IML has functions for the F, chi-squared, normal, and inverse normal. The t, F, and chi-squared functions may also be specified with non-centrality parameters.

The IML procedure is called like any other procedure in SAS. Once invoked, the commands which follow are executed according to IML syntax. When the necessary computations have been completed, IML is exited using the QUIT command. Documentation for SAS/IML, entitled *SAS/IML User's Guide*, is available for reference in LUCC's Library; it may be purchased directly from the SAS Institute. SAS is available on the VAX 8530 and can be run in either interactive or batch mode. For more information on the use of SAS or SAS/IML, contact User Services at ext. 84988.♦

DISSPLA Upgraded on VAX 8530

The DISSPLA graphics package, by Computer Associates, has been upgraded on the VAX 8530 to Version 11.0. DISSPLA is an extensive library of FORTRAN-callable subroutines which provide access to the full range of traditional graphics capabilities, including full 3-D support. Users developing their own applications or adding graphics to existing applications may want to use DISSPLA.

Before running a FORTRAN program which makes calls to the DISSPLA library, a **USE DISSPLA** command must be issued in the login session.

In addition to significant enhancements to existing capabilities, this release includes some new features; these new features and enhancements are described below.

New Features:

- **Object Rendering** - Object rendering is the ability to represent complex geometric objects in wireframe as well as fully shaded models. DISSPLA's object rendering feature provides algorithms for hidden line removal, depth sorting, front and backface visibility, a lighting model, color variations, object transformations, object clipping, and scene definition and processing. Object rendering extends DISSPLA's 3-D environment to include hither-and-yon clipping and viewing utilities such as zoom, pan, roll, and directional viewing.
- **Processing of Raster Images** - Processing of raster images allows one to read into DISSPLA any digitally recorded raster image stored as a collection of pixels. DISSPLA accepts this information within a cell array, which is treated as a drawing primitive. Raster images can be optimized for specific devices and integrated with the diverse features of DISSPLA.

Enhanced Capabilities:

- 2-D color shaded contours
- 3-D and 4-D shaded surfaces
- Increased control of minimum and maximum contour level generation
- Inverted map projections

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- Map graph clipping
- Color mapping of data with automatic legend generation and inquiry functions
- Greek and Hebrew shaded fonts
- GRAF LOG for secondary log axis with specified minimum and maximum values
- New conic primitives: arcs, circles, ellipses, elliptical arcs

Documentation for DISSPLA consists of the following:

- *CA-DISSPLA FIRST FACTS* - An introduction to CA-DISSPLA, including example programs with listed code and graphics output.
- *CA-DISSPLA User's Manual* - Two volumes of information about the basic system and the option sets.
- *CA-DISSPLA Pocket Guide* - A compiled list of commands with brief explanations and syntax of each command for easy reference.
- *CA-DISSPLA Codebook Users's Guide* - Description of a Codebook session along with a catalog of available prototypes.
- *Guide to Making CA-DISSPLA Codebook Masters* - A description of creating and modifying Masters and other Codebook files for specific needs (which requires an understanding of FORTRAN and CA-DISSPLA).

These manuals are available for reference at the Central Site Users' Area (in a documentation cabinet labelled "VAX"). ♦

New VAX Software Licensing Agreement

Attention All VAX System Managers

Lehigh University has signed a Campus-wide Software License Grant (CSLG) agreement with Digital Equipment Corporation. Under this agreement, Digital grants Lehigh VAX software licenses for over 200 products at no charge. Included in the CSLG Portfolio are all DEC Developed VAX software licenses except DEC Developed Products with royalties, Digital Distributed Software, and PC software.

The CSLG agreement provides only the "right-to-use" the products — it does not cover costs of product media and documentation. Catalogs containing these costs as well as product descriptions are available for reference in LUCC's mainframe reference Library, Room 182 of the E.W. Fairchild-Martindale Computing Center.

The CSLG agreement does not provide telephone support or software and documentation maintenance for CSLG products; these services must be purchased from Digital. Members of the CSLG program are eligible for a 10% discount on selected Digital support offerings.

Software products licensed under the CSLG agreement are subject to the following terms and conditions:

- Have a one-year term
- Cannot be redesignated or relicensed
- Cannot be used for personal or commercial use
- Must be used on VAX systems owned or leased by the University
- Are restricted to use by Lehigh faculty, staff, and students only
- Must be run under VMS V5.0 or greater
- Are for use by 1-8 users for workstations (VAXstations) and servers (VAXservers) and unlimited for all other systems
- Include the initial license and the right to new version (RTNV) for the term of the license
- Must have systems covered under an AT&T software agreement in order to use the CSLG ULTRIX and DECshell licenses

Distribution of CSLG Products

Judy Allio is responsible for the overall distribution, maintenance, and security of CSLG software and licenses.

In order to obtain CSLG product licenses and software, managers of VAX systems must provide the following information to Ms. Allio: system manager name, department name, system type, CPU serial number, and DEC software currently installed and/or licensed on the system. System managers will be required to sign a Software Copyright and Compliance Policy as well as a statement acknowledging the terms and conditions of the CSLG program.

System managers will then receive a copy of the CSLG agreement, a document describing the CSLG program, and the CSLG Portfolio, listing all the products available under the CSLG program.

Since software media is not included with the CSLG licenses, media for CSLG products must be purchased from Digital, except for CSLG products currently installed on LUCC's VAX 8530. These latter products (including upgrades) are available from LUCC and include: VAX BASIC, VAX C, VAX COBOL, VAX FORTRAN, VAX Pascal, VAX BLISS, VAX-CDD, VAX Cluster, VAX DBMS, DECnet, DECserver 200, and VAX/VMS (V5.2).

All requests for CSLG licenses and software media should be directed to Judy Allio at ext. 83993 or to Network Server ID JKA0. ♦

NASTRAN Updated on CYBER 850

NASTRAN, a software package for solving engineering problems by the finite element method, has been upgraded on the CYBER 850 to Version 66. Version 66 includes over 40 new features, including:

- Design optimization

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- A new data management system
- "Automatic restart" in all solution sequences to allow changes in design criteria
- Simplified solution structure formats
- 2-D and 3-D crack tip elements
- An isoparametric element to use with heat transfer
- A new plate element to resist skewing
- Composites to output lamina strain

Documentation is available at the Central Site Users' Area; the many NASTRAN manuals are divided between the cabinet labelled "CYBER" and the countertop documentation rack labelled "VIII". The NASTRAN documentation is also available (on one-day reserve) at the Fairchild-Martindale Library. The access method for NASTRAN is unchanged; type:

```
?NASTRAN
```

at the NOS/VE prompt to be prompted for parameters.♦

NAG Mark 13 Now Available on CYBER 850

The NAG FORTRAN Library (Mark 13) is now available under NOS/VE. NAG is a collection of mathematical and statistical subroutines which can be called from any FORTRAN-77 program. Before executing a program containing such calls, the command:

```
USE NAG13
```

must be issued in the job.

Documentation for the NAG FORTRAN Library consists of the following:

- *NAG (Mark 13) Library Manual* - This manual fully describes the library; it consists of seven volumes, all of which can be found at the Central Site Users' Area (in a cabinet labelled "CYBER").
- *NAG (Mark 13) FORTRAN Library Introductory Guide* (previously called *The Fortran Mini Manual*). This guide contains a summary of the purpose of each routine, along with recommendations on the choice and use of routines. This document is available at LUCC's Library.♦

ANSYS Updated on CYBER 850

ANSYS, a large scale, general purpose finite element analysis package, has been upgraded under NOS/VE to Version 4.4. Many new features and enhancements are contained in this release. These include: a new user interface, new elements, performance improvements, and expanded capabilities in existing analysis types. New features and enhancements are listed in an article in the 1989 issue of *ANSYS News* and in a document entitled *ANSYS Rev. 4.4 New Features*; these publications can be found in the front of the binder containing the *ANSYS User's Manual*, available at the Central Site Users' Area.

Use of the new user interface is described in the document entitled *Introducing the ANSYS User Interface at Revision 4.4*. This document can be found in the binder labelled *ANSYS Documentation*, available at the Central Site Users' Area. The user interface is an integral part of the ANSYS program, and consists of border menus and function pads. The user interface works in conjunction with the existing program structure so that experienced users don't have to learn a whole new language, and it provides on-line help in basic analysis procedures. Also, a context-sensitive filtering system shows only the program options valid for the particular analysis type and element type chosen.

Since this is an educational version, some types of computer accounts will not be permitted to use ANSYS. Course, research, and faculty consulting use are allowed, though proprietary-funded research and faculty consulting are surcharged. Contact User Services at ext. 83994 for more information on restrictions.

To start ANSYS, enter:

```
ANSYS
```

at the NOS/VE prompt. ANSYS will prompt for required information.

In addition to all the standard Tektronix devices (e.g., **/SHOW,4109**), ANSYS under NOS/VE supports the Seiko GR-1104 and GR-2414 terminals at the Central Site. Issue the ANSYS command **/SHOW,1104** or **/SHOW,2414** when using these devices.

The command **PLOT33** can be used to generate plot files for the Central Site plotters, but only after leaving ANSYS. PLOT33 defaults to using FILE33_DAT for input. If the name of the plot data file was changed via an ANSYS **/SHOW** command, specify that name when calling PLOT33. The resulting file, $LOCAL.PLOT, can then be plotted using the **PLOT_FILE** command. Graphic display capabilities of ANSYS are described in the *ANSYS 4.4 Graphics Supplement*. This document can be found in the binder containing the user interface document.

All ANSYS documentation can be found in a cabinet labelled "CYBER" at the Central Site Users' Area.♦

Micro Computing

Borland Software Agreement

Borland Site License Implemented

Sandra J. Edmiston (SJE0@LEHIGH)

Under the new Educational Site License Agreement with Borland International Inc., faculty and staff may obtain — free of charge, but without documentation — the software listed below, for installation on Lehigh-owned computing systems located on campus only. (The cost of the manuals under this Agreement is included in the list.) Details for obtaining products under this license appear later in this article.

Program	Ver.	Manual Fee
Turbo Assembler/Debugger	1.xx	$18
Turbo Basic	1.xx	10
Turbo Basic Database Tbx.	1.xx	10
Turbo Basic Editor Tbx.	1.xx	10
Turbo C	2.xx	18
Turbo Pascal	5.5x	20
Turbo Pascal Database Tbx.	4.xx	10
Turbo Pascal Editor Tbx.	4.xx	10
Turbo Pascal Gameworks	4.xx	10
Turbo Pascal Graphix Tbx.	4.xx	10
Turbo Pascal Num.Meth.Tbx.	4.xx	10
Turbo Pascal Tutor	4.xx	10
Turbo Prolog	2.xx	15
Turbo Prolog Toolbox	1.xx	10
Paradox	3.xx	85
Paradox LAN Pack	3.xx	58
Paradox 386	2.xx	85
Paradox OS/2	2.xx	85
Quattro*	1.xx	20
Reflex: The Analyst	2.xx	20
Sprint	1.xx	25
Sidekick	1.xx	10
Sidekick Plus	1.xx	20
Superkey	1.xx	10
Turbo Lightning	1.xx	10
Turbo Lightning Word Wizard	1.xx	8
Eureka	1.xx	15

* Quattro Pro is included in this agreement; however, it is not yet available.

Macintosh Products

Program	Ver.	Manual Fee
Eureka	1.xx	20
Reflex Plus	1.xx	30
Sidekick	2.xx	10
Turbo Pascal	1.xx	10
Turbo Pascal Database Tbx.	1.xx	10
Turbo Pascal Num.Meth.Tbx.	1.xx	10
Turbo Pascal Tutor	1.xx	10

Faculty, staff, and students can order personal copies of the above Borland products through the Microcomputer Store; the Store price includes documentation. To view this price list, type **IN PRICES** at the LUNA main menu, and then type **BORLAND** in the search field at the bottom of the screen.

There are three ways for faculty and staff to obtain the software under the Borland Educational Site License:

- They may download the software (excluding the Macintosh products, which will have to be obtained using the third option below) from the Network Server. They should type **IN BORLAND** at the LUNA main menu for further instructions.
- They may obtain some master disks for installation from the designated person in their academic department; that person is responsible for loaning the master disks and ensuring that borrowers complete the information required by Borland. The agreement with Borland requires that Lehigh keep a record of the number of installations of each of the products. For information on who the designated person is in a department, contact Sandy Edmiston.
- They may place an order for the software products with Sandy Edmiston. (Again, documentation will not be included.) An order can be placed by completing an on-line request form or by contacting Sandy Edmiston at the Computer Network Resource Center (ext. 84753, mornings). The on-line form may be accessed by typing **IN BORREQ** at the Network Server's LUNA main menu. When the software products are available for pick-up at the Computer Network Resource Center, the requestor will be contacted via the Network Server or by phone.

Manuals can be ordered by completing an on-line request form or by contacting Sandy. The on-line request form may be accessed by typing **IN BORMAN** at the Network Server's main menu. Note that manual orders may take from 4 to 6 weeks to be filled. The requestor will be contacted when the manuals have arrived. ♦

Site-licensed Microcomputer Software

Doris A. Oravec (DAO1@LEHIGH)

Some software acquired by the Lehigh University Computing Center is site-licensed, which means that copying of the software is authorized under certain circumstances.

Except where noted, diskettes containing site-licensed software are available for copying at the following locations:

- Computing Center Central Site Circulation Desk
- Fairchild-Martindale Library Circulation Desk
- Linderman Library Circulation Desk
- Media Center
- Educational Technology Center (Rm. E101, Bldg. A, Mountaintop)

Note that *not all software available at these sites is site-licensed.*

A list (excluding Borland products) of the software site-licensed by Lehigh University, and the conditions under which it may be copied, appear below. (The site license with Borland is described in the preceding article.)

On Campus Use - Faculty, Staff, and Students

Lehigh University faculty, staff, and students are free to make copies of the following programs for educational use on campus only:

- **EXP** - technical word processor (4-disk set)
- **MATH TEXT** - technical word processor (5-disk set)
- **WATFOR-77** - FORTRAN 77 compiler (3-disk set)
- **C-TERP** (V2.14) - C interpreter/semi-compiler (1 disk)
- **TRUE BASIC LANGUAGE & TRUE BASIC LIBRARY PRODUCTS** - BASIC compiler w/PC BASIC Converter, Developer's Toolkit, Asynch. Communications Support, and Runtime Package (5-disk set)
- **PC/PILOT** - authoring language (6-disk set)
- **PROPI** - authoring system (4-disk set) Diskettes for copying are NOT available at the Media Center or the Linderman Library Circulation Desk.
- **CALCULUS GRAPHICS** - plotting programs (2-disk set)
- **EXPLORING STATISTICS** - statistical analysis program (2-disk set)

On Campus or Personal Use - Faculty, Staff, and Students

Lehigh University faculty, staff, and students are free to make copies of the following programs for educational use either on campus or on personally-owned computers:

- **FREESTYLE** - word processor (3-disk set)
- **INTECALC** - spreadsheet program (1 disk)
- **STATGRAPHICS** - statistical analysis program (11-disk set) Diskettes for copying are NOT available at the Media Center or the Linderman Library Circulation Desk.
- **GAUSS** - mathematical and statistical programs (11-disk set) Diskettes for copying are NOT available at: Media Center, Linderman Library Circulation Desk, or Fairchild-Martindale Library Circulation Desk.
- **NUMERICAL RECIPES** - FORTRAN subroutines (1 disk) Diskettes for copying are NOT available at: Media Center, Linderman Library Circulation Desk, or Educational Technology Center.

On Campus Use - Faculty and Staff

Lehigh University faculty and staff are free to make copies of the following program for educational use on campus only:

- **NAG PC-50** - MS-FORTRAN mathematical subroutines (3-disk set)♦

Network Operation

Networking at Lehigh

Connections to the Outside World

Blair R. Bernhardt (BRB0@LEHIGH)

One of the definitions of **network** found in *The American Heritage Dictionary* is "a group or system of electric components and connecting circuitry designed to function in a specific manner." By this definition, many different things can be referred to as a *network*. In fact, at Lehigh there *are* a number of types of networks. The purpose of this article is to present an overview of the networking of computers at Lehigh.

InteCom and the Network Server

As stated in an article entitled "NetDial is Not the Network Server" which appeared in the November 1988 issue of *Computing at Lehigh*, most people refer to the InteCom digital phone system as the "campus network". With this system, one can make a connection between one's microcomputer (or terminal) and other computers by dialing the phone. A microcomputer-based program by the name of NetDial can be used to dial the phone to establish the connection. One of the mainframe computers which can be accessed through the InteCom system is the IBM 4381, which has acquired the nickname of the *Network Server*. The Network Server provides information and communications services to the users of the InteCom system. The IBM 4381 is also a BITNET node, so it can be used to communicate via electronic mail with users of other BITNET nodes.

Local Area Networks

Microcomputers at LUCC's microcomputing sites are interconnected by means of local area networks (called LAN's). Each microcomputer on the LAN contains an Ethernet card, which is connected to other micros on the LAN via an Ethernet cable. Each LAN contains one microcomputer which is dedicated to running the LAN. As the dedicated micro contains all of the software available for the microcomputers on the LAN, it is referred to as a LAN server. It is these LAN servers which contain microcomputer applications programs such as word processors and spreadsheets.

In addition to the connection to the LAN via the Ethernet card, each micro is also connected to the InteCom system through a serial port. This allows each microcomputer to dial and communicate with other computers such as mainframe computers. This communication takes place by using a terminal emulation program which allows the microcomputer to appear to the mainframe as a terminal. In addition to emulating terminals, these programs allow files to be uploaded and downloaded to and from the mainframe. One of the main functions of the LAN is to provide the communications software such as Kermit and PCWS, which NetDial automatically runs. If one has his or her own copy of NetDial, it isn't even necessary for one to log into the LAN in order to establish a connection to a mainframe.

People often ask if it is possible for them to use some particular software package which is on a LAN from their dorm rooms. This isn't possible, since the software resides on the LAN server (to which they are *not* connected) and not on any of the mainframes (such as the IBM 4381 "Network Server") to which they can connect via the InteCom system.

The Backbone Network

In addition to the InteCom system and local area networks, the University is in the process of installing a Backbone network between various campus buildings (see Figure 1). As stated in an article entitled "Status of the Lehigh University Backbone Network" which appeared in the January 1989 issue of *Computing at Lehigh*, a backbone network is a separate, high-speed network which links other networks. Currently, internal LUCC Ethernet networks (including LUCC staff LAN's) are connected to the Backbone (see Figure 2), as are some departmental LAN's within the connected buildings. It is anticipated that, eventually, all LUCC site LAN's will be interconnected by means of the Backbone network.

The Backbone network provides users of LAN's connected to it with the means to send and receive data at speeds far beyond those supported by the InteCom system. Since the Backbone network is connected to the LUCC machine room Ethernet network, which in turn is connected to external networks, all users connected to the Backbone are also provided access to the various services of the external networks which are collectively referred to as the Internet.

Electronic Mail via BITNET and the Internet

The University is connected to two different types of external networks; BITNET (via the IBM 4381 "Network Server"), and the Internet (via all Backbone network hosts). Gateways between BITNET and the Internet provide users of one of these networks the ability to send electronic mail to users of the other of these networks.

At Lehigh, BITNET is strictly for electronic mail. All users of the Network Server have a BITNET address by which ex-

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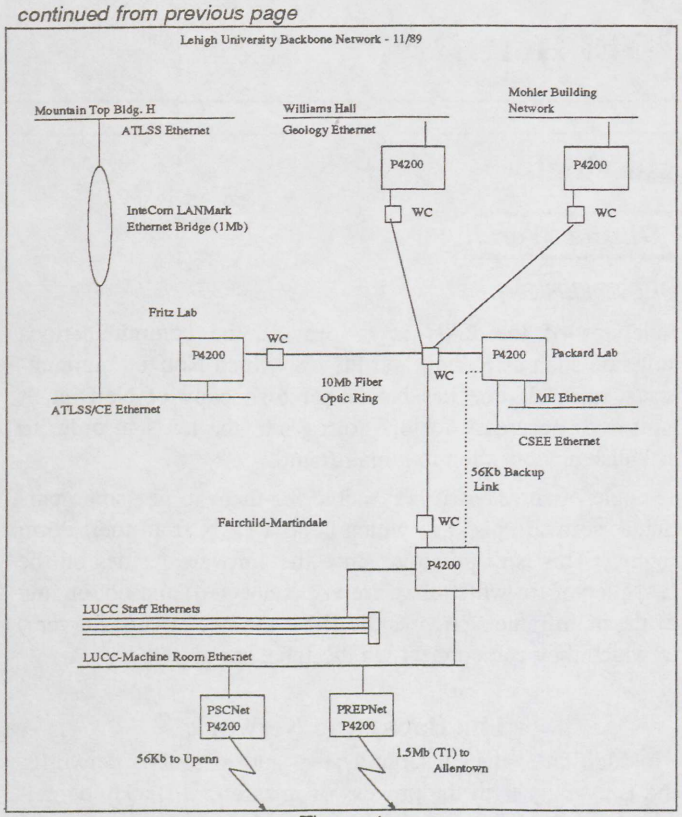

Figure 1

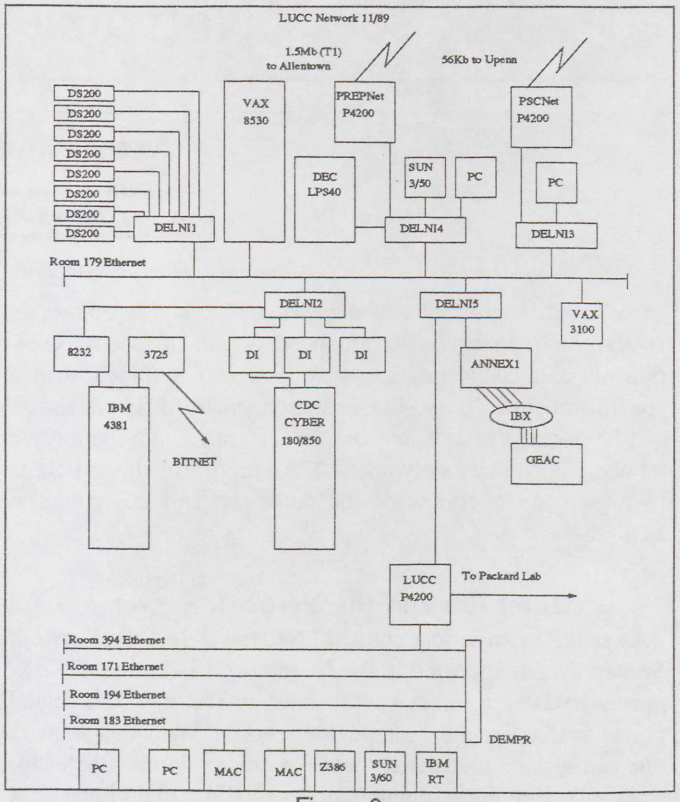

Figure 2

Legend for Network Diagrams

3725 - IBM Communication Controller

8232 - IBM LAN Channel Station (Ethernet)

ANNEX - Encore Annex II TELNET terminal server, 4 ports connected to the Libraries' GEAC Catalog System

BITNET - Because Its Time Network; 9.6Kb connections to Temple University, Franklin and Marshall, and Lafayette

CDC CYBER 180/850 - CDC1.CC.Lehigh.EDU, 128.180.2.7

DEC LPS40 - DEC PrintServer40 PostScript printer

DELNI - Ethernet 8 port transceiver multiplexor

DEMPR - DEC 8 port thinwire Ethernet repeater

DI - CDC Device Interface, 80 asynch ports, 2 synch ports, and TCP/IP

DS200 - DEC terminal server, 8 asynch ports each

IBM 4381 - IBM1.CC.Lehigh.EDU, 128.180.2.1 (VM/SP); LEHIGH (BITNET) (MUSIC); LEHIIBM1 (BITNET) (VM/SP)

IBM RT - LUCC development machine

P4200 - Proteon P4200 IP Router

PSCNet - Pittsburgh Supercomputer Center Network - 56Kb line to University of Pennsylvania

PREPNet - Pennsylvania Research Economic Partnership Network - 1.5Mb (T1) line to Bell of PA office in Allentown

Room 183/194, Room 394, Room 171 Ethernets - staff Ethernet networks, equipment running TCP/IP and Novell Netware

SUN 3/50 - Network support computer

SUN 3/60 - LUCC development machine

VAX 8530 - VAX1.CC.Lehigh.EDU, 128.180.2.5

VAX 3100 - LUCC development machine

WC - Wire Center

Z386 - Zenith Z386 running SCO Xenix

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ternal users of BITNET may send them electronic mail. This address is of the form:

```
username@LEHIGH
```

where **username** is the user's four character user ID. External users of the Internet may send Network Server users electronic mail by sending to the address of the form:

```
username%LEHIGH@IBM1.CC.Lehigh.EDU
```

or, if the external system is so configured:

```
username@LEHIGH.BITNET
```

Network Server users may go about sending electronic mail to external users of BITNET or the Internet by entering **SE B** at the LUNA main menu and then entering the external user's address at the "To:" field on the next screen. The internal mailer on the Network Server will automatically determine whether the address is a BITNET address or an Internet address and will route the message accordingly. For more information on using BITNET with the Network Server, see Technical Bulletin #9 entitled "Accessing BITNET from the Network Server". This may be viewed on the Network Server by entering **IN TECHBULL** at the LUNA main menu.

Users of the CYBER 850 and the VAX 8530, which are Internet nodes, can also receive electronic mail from external BITNET and Internet users. The addresses to which the external users should send the mail are of the form:

```
username@CDC1.CC.Lehigh.EDU
```

for the CYBER, and

```
username@VAX1.CC.Lehigh.EDU
```

for the VAX. Users of these machines may send electronic mail to external users of BITNET or the Internet via the **MAIL** programs on these machines.

Internet Communications

Unlike BITNET, Internet provides services in addition to electronic mail by way of application programs such as TELNET and FTP (File Transfer Protocol). As explained in the articles entitled "Using TELNET" and "Using FTP", both of which appeared in the January 1989 issue of *Computing at Lehigh*, TELNET is a program which allows users to log in to remote computers from local computers, while FTP is a program for transferring files between computers that are connected to the Internet. Before TELNET or FTP can be utilized to access a remote computer, one must know the Internet address of that computer. Addresses are further explained in the article entitled "Host Names and the Domain Name System" which appeared in the March 1989 issue of *Computing at Lehigh.*

Of course, one must have access privileges in order to be able to log in to remote computers using TELNET. In the case of a researcher on this campus working on a project with a colleague from another campus, getting an account on the remote machine may not be a problem.

In general, using FTP to obtain files from another machine also requires one to have access privileges to that machine. Even then, it is only the files which are accessible to that account which can be obtained with FTP. Some machines have publicly accessible accounts and contain public domain software which one may obtain with FTP. In this case, one would FTP to the remote machine with a username of **anonymous** and a password of **guest.**

Since both the CYBER 850 and the VAX 8530 are connected to the Internet, FTP can be utilized as a quick and effective method for transferring files between these LUCC machines. In addition, TELNET can be utilized from either of these machines in order to access the other without logging out of the first machine. This can be an effective tool in the development of projects which require the use of both the CYBER 850 and the VAX 8530.

Note: Back issues of *Computing at Lehigh* are available on the Network Server; type **IN C@L** at the LUNA main menu.♦

General Interest

Borrowing Material at the Central Site

Doris A. Oravec (DAO1@LEHIGH)

The Computing Center's Central Site Circulation Window has software and manuals which users may borrow for use at the Central Site Users' Area. The software and manuals which are available at this location are included on the Network Server under INfo topics **MICRO** and **DOCUMENT**, respectively. The location of software and manuals is also available in LULIB, the LUCC on-line software catalog system on the VAX; this catalog system can be accessed by typing **LULIB** at the VMS prompt.

Material borrowing policies are listed below:

- A borrower must have a valid Lehigh University ID card (or a valid Lehigh University Libraries ID card).
- Material must be returned on the day it was borrowed, before the Circulation Window closes. Material may not be kept overnight. To determine the borrowing period for a given day of the week, check the consulting hours listed on the Central Site Operating-Consulting Schedule which is posted at the Central Site and on the Network Server under INfo topic **CCHOURS**.
- All borrowed material must remain at the Central Site; it is not to be taken to any other location. A borrower who removes software or manuals from the building risks being fined.

The Computing Center uses the University Libraries' GEAC circulation system, via a GEAC terminal, to circulate material at the Central Site. Although this terminal is connected to the Libraries' GEAC system, material borrowed at the Libraries cannot be discharged at LUCC's terminal. Likewise, material borrowed at the Computing Center's Central Site cannot be discharged at the GEAC terminals in the Libraries.

The GEAC circulation system automates the issuance of fines for material returned late or not at all. In addition, until all overdue materials are returned, all borrowing privileges of the offender's ID card - both at the Computing Center and at the Libraries - are suspended. The fine is one dollar per day for each overdue item, for up to ten days. (The offender is sent an overdue notice the day after the material was borrowed.) When the material is returned and discharged from the GEAC system, the terminal will display the amount of the fine, which is to be paid to LUCC's Software Librarian in Room 185. (The offender will also be sent a fine notice, which can be ignored if the fine has been paid.) If the overdue material is not returned within ten days of being borrowed, it is considered lost and the offender is sent a bill for replacement. If the bill is not paid by the end of the academic session, the charge will appear on the offender's Bursar's bill.♦

Consultant's Corner - Q and A

Question: When trying to compile and execute on the CYBER some of the sample FORTRAN programs listed in the DISSPLA manual, I received error LL170 stating: "Duplicate definition of entry point {text} encounter. First definition holds." Other programs execute properly. What's wrong?

Answer: ERROR LL 170 is a loader error. The compiled program was not loaded properly into memory because it contained calls to subroutines that had been defined twice. The reason why some other programs executed without errors is because they did not contain calls to subroutines which had been defined more than once. The CALCOMP and DISSPLA packages have some subroutines (e.g., GRID and SMOOTH) by the same names. Thus, after **USE DISSPLA** is typed to add the DISSPLA routines to one's FORTRAN library, some routines will have two definitions. By issuing the following command, the error LL170 will be ignored and the use of the second definition will be forced:

```
SETPA TEL=FATAL
```

or

```
SET_PROGRAM_ATTRIBUTE TERMINATION_ERROR_LEVEL=FATAL
```

It is not a good practice to issue this command right at the beginning of a terminal session (e.g., by including it in the user PROLOG file). Issuing the above command is recommended only for situations such as this where the loader is required to ignore the error messages for successful execution of the program.

Question: When using DISSPLA on the VAX 8530, will the same problem arise?

Answer: On the VAX 8530, the FORTRAN library does not automatically include the CALCOMP routines. The CALCOMP routines are not added to the library unless one enters the **USE PLOT** command at the VAX prompt.

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A problem similar to that on the CYBER will arise if both the CALCOMP and DISSPLA libraries are added to the FORTRAN library. If you are a frequent user of both the CALCOMP and DISSPLA packages on the VAX, ensure that only one of the two is loaded during your terminal session. On the VAX, the commands listed below can be used to load and unload the CALCOMP and DISSPLA libraries.

- **USE PLOT** - adds the CALCOMP library to the library list.
- **DELL PLOT** - deletes the CALCOMP library from the library list.
- **USE DISSPLA** - adds the DISSPLA library to the library list.

The following three commands delete DISSPLA libraries from the library list:

- **DELL LU$LIB:[DIS10P5.LIB]INTLIB15**
- **DELL LU$LIB:[DIS10P5.LIB]DISLIB**
- **DELL CPLOT**

Question: How can one view Minitab g-graphics output on the screen?

Answer: One method to view Minitab g-graphics output on the screen is to use NetDial to connect to the VAX and then use Kermit to emulate a Tektronix 4010 terminal. To do this interactively, invoke Minitab and enter the commands to produce the graph. Be sure to include the GOPTIONS subcommand:

```
DEVICE='TEK4010'
```

Before pressing **Return** after the last command defining the plot, press **Alt T** (hold down the **Alt** key and press the **T** key) three times; the screen will clear. **Alt T** is a NetDial-defined key combination (the same as Kermit's **Alt Minus**) which toggles through Kermit's supported terminal types in the following order: VT100, VT52, Heath-19, TEK4010, and back to VT100. The terminal will then be in Textronix 4010 emulation mode. Press **Return** and the graph will be written to the screen. When ready to continue, press **Alt T** again to return to VT100 emulation. Similar techniques may also be used to display graphs saved in files or graphs produced during batch jobs. Those who would like more information should contact User Services ext. 84988.♦

CCAC Highlights

The Computing Center Advisory Committee (CCAC) charter requires that CCAC meeting "highlights" be reported here, and that the full minutes be available on the Network Server. To access the minutes on the Network Server, type **IN CCAC-MIN** *at the LUNA main menu.*

Computing Center Advisory Committee Minutes: August 23, 1989

Members present: W. Brichta, T. Foley, B. Fritchman, R. Gruver, J. Hansz, W. Harris, E. Kay, R. Kendi, R. Lawrence, C. Lidie, D. Sanchez, K. Weiner, J. Williams

It was reported that the memory of the public Z-158's was upgraded to 640K but, due to a problem, the additional memory at some of the computing sites had to be pulled out. The projection system in Packard Lab 416 will be installed soon. Due to the Microcomputer Store selling machines with only 3½" floppy disk drives, the Center has made machines available with both 5¼" and 3½" drives for conversion purposes. The Macintosh computers for the Central Site will be delivered soon.

Since NOS was removed from the CYBER 850, a new version of NetDial is available. It includes some new features, such as off-campus access to ASA and direct access to BRS. The new 2400/1200 baud modem pool was installed on July 21st. A few people indicated having problems with the new modems, but the new version of NetDial seems to have taken care of that problem.

The software library has been expanded into the former Special Equipment Room. Two User Services consultants left the Center this summer and new personnel have been hired. Dean Nelson will be full-time and Binod Taterway will initially be part-time.

The Ardent computer has been installed in the CAD Lab and two VAX 3400's are presently being installed.

Users who have just initialized their Network Server accounts will be able to use them immediately and not have to wait till the next day, as was necessary in the past.

After a short discussion, the CCAC agreed to dissolve both the Graphics and the Statistical subcommittees.

Jim Hansz was reelected by the Business College to be the CCAC representative. Frank Harvey will be the new representative from the College of Education and Gary Lutz will continue as the other representative from Education. Ed Kay will continue another term, representing the Engineering College.

Computing Center Advisory Committee Minutes: September 25, 1989

Members present: W. Brichta, W. Dimm, T. Foley, B. Fritchman, B. Hargreaves, W. Harris, E. Kay, R. Kendi, C. Kraihanzel, R. Lawrence, C. Lidie, J.G. Lutz, M. Newman, D. Sanchez, K. Weiner, J. Williams

The minutes of the August 23rd meeting were approved, although it was pointed out that Jack Paul will be a CCAC representative from the Business College and not Jim Hansz.

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It was reported that the Geology Department Ethernet has been connected to the backbone network, making a total of five buildings connected to the backbone. Linda Orr, a consultant in User Services, will be leaving Lehigh as of December 1st.

The modem pool problems are being corrected. Busy signals continue to be a problem and that is being addressed by Telecommunications. The number of trunk lines into the University is being investigated with Bell of Pa.

It was reported that at a meeting to discuss the decreasing sponsored research income of the Computing Center, it was agreed that the solution may be to stop charging for computer use by sponsored users and to make it possible for the Center to charge for extensive services, many personnel-related. The reason for ceasing charging for computer use is the inability to measure use reasonably, except in the case of mainframe use. The charging for services could allow the Center to build these services, as the demand for it grows.

The high demand for LUCC seminars was described, noting that there were many people on waiting lists. With this demand, the problem of registrants not showing up for seminars is becoming more acute.

It was reported that the Microcomputer Store showed a surplus for fiscal year 1988-89, the first time since its opening in 1985.

It was requested that the Committee consider a policy whereby when a person tries to purchase a workstation, he or she must first identify a funding source for the maintenance. It is important that the University force people to look at maintenance as one of the ongoing costs of ownership of workstations.♦

Staff Changes

Binod K. Taterway, who has been one of our Student Consultants since Fall '87, has joined User Services as a User Consultant. Binod has a Bachelor of Technology ('85) in Electrical Engineering from the Indian Institute of Technology in Bombay, and recently received his M.S. in Computer Science from Lehigh. Binod is fluent in a number of programming languages, and has worked on a number of machines running different versions of Unix.♦

Computing at Lehigh Contribution Information

Computing at Lehigh encourages contributions for articles and *Consultant's Corner.*

Contributions can either be submitted electronically via the Network Server to user BRB0, or be provided on a MS-DOS formatted diskette. Contributions sent via the Network Server must be in ASCII format (i.e., be plain text). Acceptable document formats are:

- ASCII (not word-processed)
- EXP
- Freestyle
- WordStar
- WordPerfect

Printed copy is welcomed, but please also accompany the printed copy with the text in one of the above formats (especially for articles and other long contributions). All mailed contributions (whether on diskette or printed) should be sent to the following address:

Editor, *Computing at Lehigh*
194 Fairchild-Martindale #8b
Computing Center
Lehigh University
Bethlehem, PA 18015

Contributed articles are included in *Computing at Lehigh* at the discretion of the Computing Center. The Computing Center reserves the right to edit all contributions. Article submissions must be received by July 31st for the August issue; September 15th for the October issue; December 15th for the January issue; and, February 10th for the March issue. Be sure to include your name, mailing address, and phone number.

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